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October 26, 2021 Project# 219050.014

To: Denise Harris, Planning Manager
Town of Warrenton
21 Main Street
Warrenton, VA 20186

From: Chris Tiesler, PE, PTOE; Andy Duerr, PE; Josh Hurst, PE

CC: Paul Bernard, PE

RE: E Lee Street/Walker Drive Roundabout **(Updated 10/26/21)**

INTRODUCTION

Kittelson & Associates, Inc. (Kittelson) has prepared this memorandum to summarize its evaluation of a potential roundabout at the E Lee Street/Walker Drive intersection in the Town of Warrenton, Virginia. The Town plans to apply for revenue sharing funds through the Virginia Department of Transportation (VDOT) for this Tier 1 project, and VDOT has previously prepared an initial concept design and cost estimate. Kittelson has independently reviewed the traffic operations, concept design, and cost estimate assumptions for opportunities to value engineer the design and reduce impacts/costs. The remainder of this document summarizes our findings.

Traffic Operations

The roundabout concept developed by VDOT was based on year 2025 traffic volumes documented in a traffic impact analysis (TIA)[1] for a proposed development in the NE quadrant of the E Lee Street/Walker Drive intersection. The 2025 forecast volumes were developed inclusive of a one percent annual growth rate representing regional growth, as well as two specific development projects (Walker Drive Rezoning and Warrenton Crossing). In initial discussions with VDOT staff, the project team determined it would be appropriate to extend the design year assumptions for the roundabout to 2040. As such, the 2025 volumes were grown with a one percent annual growth rate out to year 2040. This additional growth accounts for other future developments (such as the Fauquier County Central Sports Complex and additional regional growth).

Kittelson evaluated both initial year 2025 and design year 2040 traffic volumes using SIDRA 8 software in accordance with VDOT's *Traffic Operations and Safety Analysis Manual* (TOSAM) v 2.0. Various roundabout approach lane configurations were tested to optimize the roundabout to minimize the footprint while achieving target operational performance standards. Opportunities to initially construct a full single-lane roundabout with potential expansion were also explored (see Concept Design section for more detail regarding expansion potential). Ultimately, a hybrid multilane roundabout was identified as the optimal configuration. **Exhibit 1** schematically illustrates the lane configuration identified.

[1] The Traffic Group. *Walker Drive Properties TIA*. April 2016.

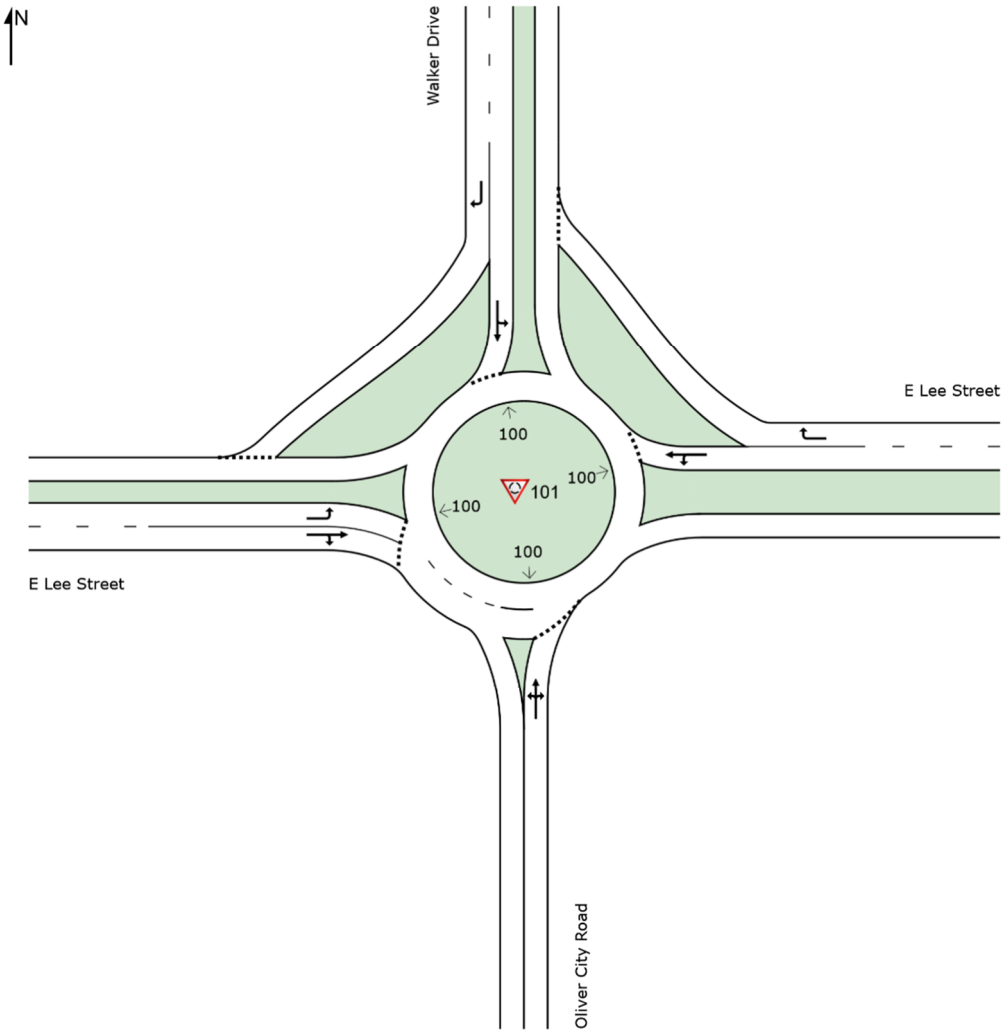


Exhibit 1. SIDRA Schematic Roundabout Lane Configuration

Table 1 and **Table 2** summarize the year 2025 and 2040 traffic operations for the weekday p.m. and Saturday peak hours, respectively. **Attachment A** contains the detailed SIDRA operational output worksheets.

Table 1. Year 2025 Traffic Operations – Weekday PM & Saturday Peak Hour

Peak Hour	LOS	v/c	Delay (s)	Queue (ft)
PM	B	0.654	10.7	226.6
SAT	A	0.513	7.7	111.8

LOS – Level of Service; v/c – Volume-to-capacity ratio.

Table 2. Year 2040 Traffic Operations – Weekday PM & Saturday Peak Hour

Peak Hour	LOS	v/c	Delay (s)	Queue (ft)
PM	C	0.842	18.2	485.9
SAT	A	0.639	9.9	212.4

As shown in Tables 1 and 2, the proposed roundabout configuration is forecast to operate acceptably through at least the design year of 2040. Uncertain time frames for known/approved developments to build out and lingering uncertainty regarding long-term COVID-related impacts to traffic volumes suggest that the proposed configuration may in fact function adequately well beyond 2040.

Weekday AM peak hour volumes were not readily available, nor does the weekday AM peak hour seem to be critical to the subject intersection. Prior studies for developments in the vicinity of this intersection have not included a weekday AM analysis, and a review of assumed development trip generation estimate for the weekday AM peak hour indicates volumes would be 35% and 29% *lower* than the weekday PM and Saturday midday peak hour conditions, respectively. Therefore, it's reasonable to conclude that weekday AM volume profiles and operational results are not critical to determining the appropriate lane configuration for the roundabout.

Concept Design

After optimizing the requisite lane configuration as described above, Kittelson developed alternative horizontal alignments for the roundabout. Kittelson retained the general size of the roundabout using an inscribed circle diameter ranging from 120 to 140 feet for the hybrid configuration. The primary differences between the Kittelson design and the original VDOT layout include the following:

- We assumed that the design vehicle was a WB-67 for the westbound approach and we assumed that this large vehicle would need to turn right onto Walker Drive. The remainder of the roundabout was designed to accommodate school buses and SU-40 trucks in the travel lanes (i.e., without needing to traverse across curbs or truck aprons).
- We checked fastest paths for every movement and reviewed sight distance triangles for several critical movements.
- Sidewalks and shared-use paths have been added to the north, south, and east sides of the roundabout. Improved multimodal connections will assist residents south of the roundabout (including a historically disadvantaged neighborhood) access the Town center and the new development along Walker Drive.
- The VDOT cost estimate included funds for a pedestrian hybrid beacon (HAWK signal). Our proposed configuration eliminates the need for the pedestrian hybrid beacon by eliminating crosswalks with multiple approach lanes by designing a refuge island between the two eastbound approach lanes.
- Two entry lanes are provided on eastbound Lee Street, but the exclusive left turn lane is added just prior to the roundabout. A spiral is introduced in the circulatory roadway in front of the western leg to accommodate the separate eastbound left-turn lane through the roundabout.
- The southbound right-turn lane is separated out into a high angle yielding right-turn bypass lane. Only one southbound lane is provided for through movements and left turns. This eliminates the need to carry two circulatory lanes across in front of the west leg of the roundabout.

- The westbound right-turn bypass lane was converted to a high angle yielding right-turn bypass lane. High angle designs are generally better for pedestrians and cyclists and does not adversely affect the capacity of this movement.
- Overall, the Kittelson concept eliminates lanes where possible to increase green space, reduce additional impervious areas and right-of-way impacts, and introduce multimodal facilities beneficial to the context of the surrounding land uses.

Designing multilane roundabouts for phased construction to begin as simpler, single-lane roundabouts has several advantages. It minimizes conflict points and potential for crashes and presents the simplest navigable roundabout for drivers. It minimizes pedestrian exposure and crossing distances. It also has the benefit of not being overbuilt if anticipated long-term traffic volume growth is never realized. The Kittelson concept has been designed under this premise so that full roundabout footprint is constructed to set perimeter drainage, utilities, right-of-way, and roadway lighting – but additional lanes providing capacity needed in the long-term are left out of the opening day configuration. The temporary curb lines and truck apron can be easily removed and replaced with travel lanes if/when the additional capacity is required. The image below is an example of how this can be accomplished.

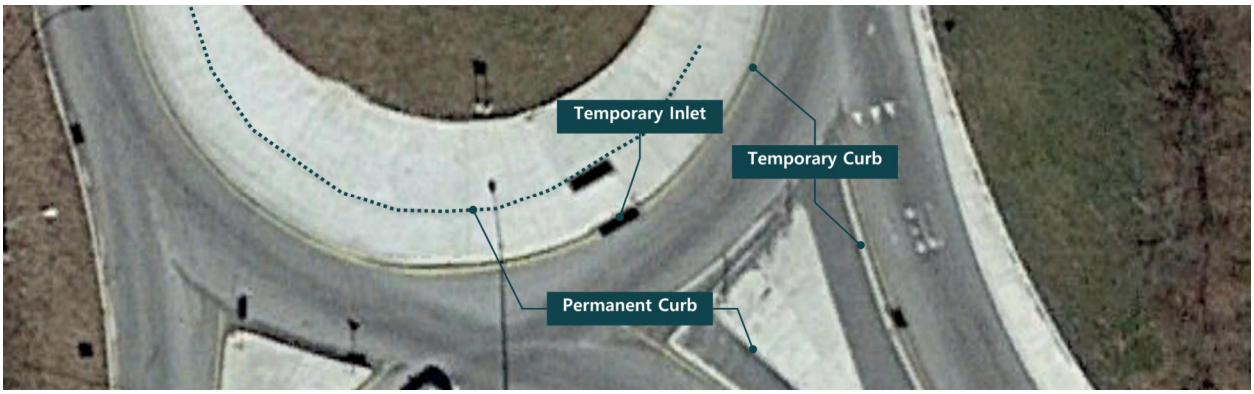
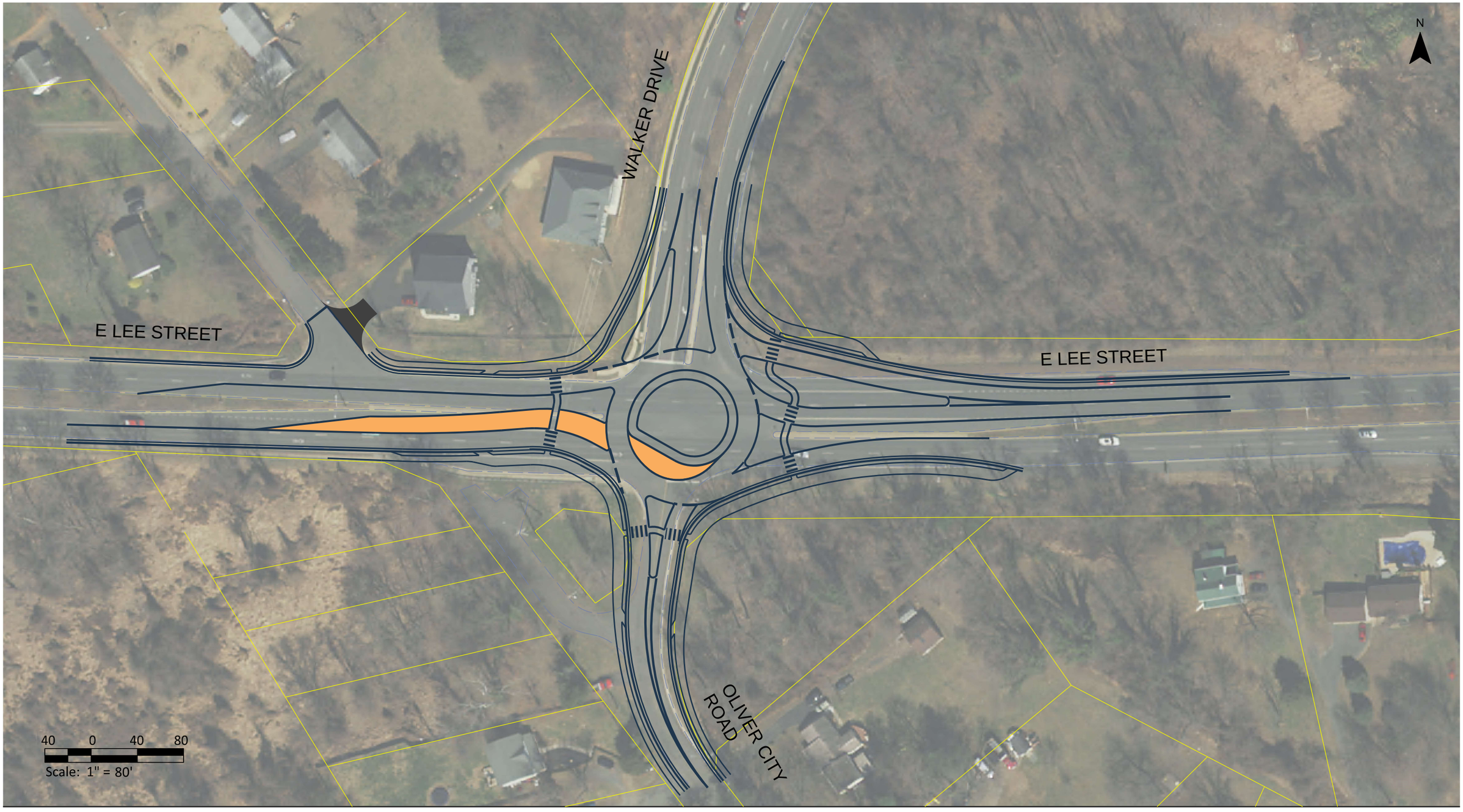


Image: Google Earth. Sterretts Gap, Pennsylvania – SR 34 @ Sunnyside Drive

Given the uncertain time frames for known/approved developments to build out and lingering uncertainty regarding long-term COVID-related impacts to traffic volumes, a pure single-lane configuration may in fact function adequately longer, or even in perpetuity.

Figure 1 illustrates a potential opening day configuration that operates as a single-lane roundabout with right-turn bypass lanes in the southbound and westbound directions. Although their ultimate curb lines are provided within the initial construction phase, the eastbound exclusive left-turn lane and the second lane within the circulatory roadway would *not* be initially provided. The incremental project to add these features later are minimized through this design approach.

Figure 2 illustrates the ultimate lane configuration that develops the separate eastbound left-turn lane into the median and adds the exclusive left turn lane within the circulatory roadway and associated refuge island and striping to spiral out the left-turn lane to travel north on Walker Drive.

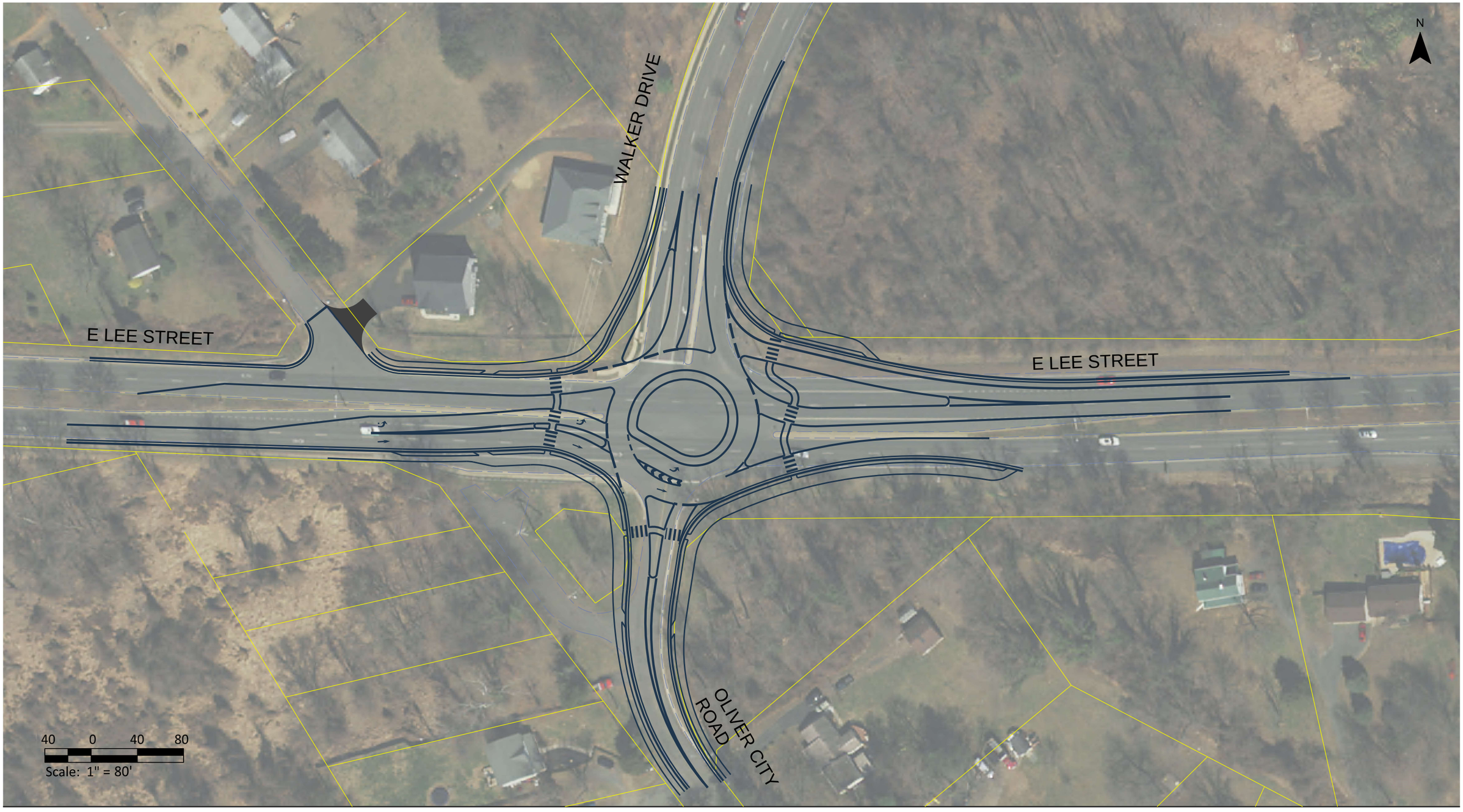


Phase 1: Revised Roundabout Concept
E Lee Street / Walker Drive
Warrenton, Virginia

Figure
1

KAI_LEE WALKER ROUNDABOUT_10.2021_KDC

KITTELSON & ASSOCIATES



Revised Roundabout Concept
E Lee Street / Walker Drive
Warrenton, Virginia

Figure
2

KAI_LEE WALKER ROUNDABOUT_10.2021_KDC

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Stormwater Management

The proposed roundabout configuration considered at the E Lee Street/Walker Drive intersection results in a reduction in impervious area. With that reduction, stormwater management concept must still address water quality and water quantity per the Virginia Department of Environmental Quality (DEQ) Virginia Stormwater Management Plan (VSMP) Regulations.

WATER QUALITY

The total land disturbance is estimated to be 3.5 acres, which includes removing curb, median, and full depth pavement (which is not considered routine maintenance, per Chapter 3.1, Article 2.3 of the State Water Control Law - Section 62.1-4.15:34.C.7). This project falls under the Part IIB criteria of the VSMP Regulations. Per Section 9VAC25-870-63 of the VSMP Regulation, redevelopment projects that do not have a net increase in impervious area will require the phosphorous load to be reduced to 20% below the predevelopment load. Similarly, for linear projects with increased impervious area, the same 20% phosphorous load reduction applies. As a result, this project will require a 20% phosphorous load reduction. Using the VRRM Spreadsheet v3.0, preliminary calculations identify that the project will be required to remove 0.46 pounds of phosphorous. The concept design proposes providing this required treatment volume entirely within the right-of-way via (1) a permeable paver truck apron in the roundabout island, and (2) a proposed bioretention basin or dry swale in the new westbound island on the northeast corner of the intersection. Preliminary calculations show that these measures should provide sufficient phosphorous removal. The roundabout at the intersection will not change the core of the existing stormwater collection system but will add additional pre-treatment measures.

As an alternative to adding pre-treatment measures, phosphorous credits are available for purchase within the Rappahannock River Basin from the Belle Meade Nutrient Bank in Culpeper County. Per VDOT IIM-LD-251.5, “the purchase of nutrient credits may eliminate the need for the purchase of additional right of way or permanent easement and relieve the Department of future maintenance costs. The purchase of nutrient credits to address post-construction water quality reduction requirements for construction activities shall be considered the preferred alternative when available and economically feasible.” The purchase of credits should be considered further as the design progresses.

WATER QUANTITY

Preliminary calculations for the concept design show that the post-development flow will not exceed the pre-development flow rates. The proposed improvements maintain catchment areas for each of the existing inlets while reducing the amount of impervious area, resulting in a net reduction of peak flows.

Based on preliminary calculations for water quality and water quantity, the drainage concept will satisfy Commonwealth of Virginia requirements. As the design progresses, additional calculations and details will be required and the design modified accordingly.

Concept Estimate

Based on the above discussion and concepts, Kittelson developed a planning level opinion of probable construction costs (OPCC) that uses the VDOT Culpeper Concept Estimate Workbook. The OPCC assumes the following:

- Full depth asphalt pavement is replaced for the first 50 feet on each approach to the roundabout, and a 3-inch mill and overlay further to the project limits.
- Retaining wall is added in the northwest corner of the intersection to reduce grading and impacts to the northwest corner properties and overhead utilities.
- Stormwater management is addressed within the roundabout island, within the northeast median island, or via nutrient credits.
- New curb, curb and gutter, sidewalk, and CG-12 ramps are included, as shown on the concept plans.
- A total of 0.4 acres is anticipated to be acquired from a total of five (5) parcels. Acquisition costs are assumed to be $30/SF and include a 60% contingency.

The overall project cost is estimated to be $4.7 million, which includes:

- $1.0 million for Design fees
- $0.9 million for Right-of-Way acquisition and Utility relocation
- $1.9 million for Construction
- $0.4 million for Construction Engineering and Inspection
- $0.5 million for Contingency

If the Town of Warrenton were to locally administer the project, we anticipate the Design scope could be reduced further to approximately $700,000, providing an additional savings of $300,000.

The VDOT Culpeper Concept Estimate Workbook for this project is included in **Attachment B**.

CONCLUSION

Based on our evaluation, we believe there are opportunities to further value engineer the roundabout design concept at the E Lee Street/Walker Drive intersection to reduce costs and aid in obtaining revenue sharing funds for the project. A summary of our findings and recommendations is provided below.

- A hybrid multilane roundabout will perform acceptably through the design year of 2040 based on current volume/growth assumptions.
    - A full single-lane roundabout would provide adequate capacity for several years and suggests a design that plans for phased construction of future additional capacity is appropriate.
    - The timing or ultimate need of the separate eastbound left-turn lane can be monitored and planned for as needed.
- The Kittelson concept eliminates lanes where possible to increase green space, reduce additional impervious areas and right-of-way impacts, and introduce multimodal facilities beneficial to the context of the surrounding land uses.

- The phased design plan optimizes the long-term operational safety and performance of the roundabout.
- The Kittelson concept satisfies Commonwealth of Virginia quantity and quality requirements for stormwater management.
- Kittelson prepared a planning level opinion of probable construction costs (OPCC) using the VDOT Culpeper Concept Estimate Workbook.
    - The overall project cost is estimated to be $4.7 million, which includes:
        - $1.0 million for Design fees
        - $0.9 million for Right-of-Way acquisition and Utility relocation
        - $1.9 million for Construction
        - $0.4 million for Construction Engineering and Inspection
        - $0.5 million for Contingency
    - If the Town of Warrenton were to locally administer the project, we anticipate the Design scope could be further reduced, providing an additional cost savings of $300,000.

Should you have any questions, please contact Chris Tiesler at 571.384.2943 or ctiesler@kittelson.com.

ATTACHMENTS

Attachment A – Year 2025 & 2040 SIDRA Operational Analysis Worksheets
Attachment B – VDOT Culpeper District Workbook Cost Estimate Worksheets

Attachment A

SIDRA Operational Worksheets

MOVEMENT SUMMARY

Site: 101 [2025 PM - Hybrid SIDRA]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Oliver City Road												
3	L2	5	3.0	0.329	13.7	LOS B	1.7	44.4	0.80	0.83	0.87	22.7
8	T1	28	3.0	0.329	13.7	LOS B	1.7	44.4	0.80	0.83	0.87	22.2
18	R2	113	3.0	0.329	13.7	LOS B	1.7	44.4	0.80	0.83	0.87	21.7
Approach		147	3.0	0.329	13.7	LOS B	1.7	44.4	0.80	0.83	0.87	21.9
East: E Lee Street												
1	L2	138	3.0	0.431	7.3	LOS A	3.4	87.0	0.57	0.38	0.57	30.9
6	T1	388	3.0	0.431	7.3	LOS A	3.4	87.0	0.57	0.38	0.57	30.7
16	R2	600	3.0	0.490	8.2	LOS A	4.1	105.8	0.60	0.41	0.60	29.8
Approach		1126	3.0	0.490	7.8	LOS A	4.1	105.8	0.58	0.40	0.58	30.2
North: Walker Drive												
7	L2	586	3.0	0.654	13.6	LOS B	8.9	226.6	0.90	0.99	1.29	27.3
4	T1	59	3.0	0.654	13.6	LOS B	8.9	226.6	0.90	0.99	1.29	27.1
14	R2	191	3.0	0.173	4.8	LOS A	1.1	27.5	0.57	0.41	0.57	31.3
Approach		836	3.0	0.654	11.6	LOS B	8.9	226.6	0.82	0.86	1.13	28.1
West: E Lee Street												
5	L2	188	3.0	0.367	12.9	LOS B	2.6	65.5	0.89	0.88	0.91	27.3
2	T1	388	3.0	0.578	14.9	LOS B	6.4	163.8	0.99	1.10	1.32	28.1
12	R2	14	3.0	0.578	14.9	LOS B	6.4	163.8	0.99	1.10	1.32	27.4
Approach		590	3.0	0.578	14.3	LOS B	6.4	163.8	0.96	1.03	1.19	27.8
All Vehicles		2699	3.0	0.654	10.7	LOS B	8.9	226.6	0.75	0.70	0.90	28.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2025 SAT - Hybrid SIDRA]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Oliver City Road												
3	L2	8	3.0	0.221	9.5	LOS A	1.0	26.5	0.70	0.70	0.70	23.7
8	T1	22	3.0	0.221	9.5	LOS A	1.0	26.5	0.70	0.70	0.70	23.2
18	R2	93	3.0	0.221	9.5	LOS A	1.0	26.5	0.70	0.70	0.70	22.6
Approach		123	3.0	0.221	9.5	LOS A	1.0	26.5	0.70	0.70	0.70	22.8
East: E Lee Street												
1	L2	96	3.0	0.347	6.1	LOS A	2.5	63.7	0.48	0.30	0.48	31.5
6	T1	342	3.0	0.347	6.1	LOS A	2.5	63.7	0.48	0.30	0.48	31.3
16	R2	588	3.0	0.464	7.6	LOS A	3.8	97.0	0.53	0.34	0.53	30.0
Approach		1026	3.0	0.464	7.0	LOS A	3.8	97.0	0.51	0.32	0.51	30.6
North: Walker Drive												
7	L2	512	3.0	0.513	9.4	LOS A	4.4	111.8	0.75	0.65	0.80	28.6
4	T1	38	3.0	0.513	9.4	LOS A	4.4	111.8	0.75	0.65	0.80	28.5
14	R2	146	3.0	0.126	4.2	LOS A	0.7	18.9	0.51	0.35	0.51	31.6
Approach		696	3.0	0.513	8.3	LOS A	4.4	111.8	0.70	0.59	0.74	29.2
West: E Lee Street												
5	L2	160	3.0	0.241	8.4	LOS A	1.5	39.5	0.77	0.69	0.77	28.8
2	T1	248	3.0	0.303	7.7	LOS A	2.2	56.1	0.80	0.69	0.80	30.9
12	R2	7	3.0	0.303	7.7	LOS A	2.2	56.1	0.80	0.69	0.80	30.0
Approach		414	3.0	0.303	7.9	LOS A	2.2	56.1	0.79	0.69	0.79	30.0
All Vehicles		2259	3.0	0.513	7.7	LOS A	4.4	111.8	0.63	0.49	0.64	29.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
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Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2040 PM - Hybrid SIDRA]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: Oliver City Road												
3	L2	7	3.0	0.461	20.1	LOS C	2.9	73.4	0.87	1.01	1.18	21.3
8	T1	33	3.0	0.461	20.1	LOS C	2.9	73.4	0.87	1.01	1.18	20.9
18	R2	132	3.0	0.461	20.1	LOS C	2.9	73.4	0.87	1.01	1.18	20.5
Approach		171	3.0	0.461	20.1	LOS C	2.9	73.4	0.87	1.01	1.18	20.6
East: E Lee Street												
1	L2	160	3.0	0.519	8.9	LOS A	4.5	114.8	0.66	0.48	0.66	30.2
6	T1	450	3.0	0.519	8.9	LOS A	4.5	114.8	0.66	0.48	0.66	30.0
16	R2	697	3.0	0.590	10.3	LOS B	5.6	142.2	0.71	0.52	0.71	28.9
Approach		1307	3.0	0.590	9.7	LOS A	5.6	142.2	0.69	0.50	0.69	29.5
North: Walker Drive												
7	L2	680	3.0	0.842	25.6	LOS D	19.0	485.9	1.00	1.46	2.11	23.9
4	T1	68	3.0	0.842	25.6	LOS D	19.0	485.9	1.00	1.46	2.11	23.8
14	R2	222	3.0	0.214	5.5	LOS A	1.4	36.2	0.64	0.49	0.64	31.0
Approach		971	3.0	0.842	21.0	LOS C	19.0	485.9	0.92	1.24	1.77	25.2
West: E Lee Street												
5	L2	218	3.0	0.534	21.1	LOS C	4.8	122.8	1.00	1.13	1.33	24.9
2	T1	450	3.0	0.831	34.6	LOS D	14.9	381.4	1.00	1.49	2.12	22.6
12	R2	16	3.0	0.831	34.6	LOS D	14.9	381.4	1.00	1.49	2.12	22.1
Approach		685	3.0	0.831	30.3	LOS D	14.9	381.4	1.00	1.37	1.87	23.3
All Vehicles		3133	3.0	0.842	18.2	LOS C	19.0	485.9	0.84	0.95	1.31	26.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
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Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2040 SAT - Hybrid SIDRA]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles

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South: Oliver City Road												
3	L2	9	3.0	0.296	12.2	LOS B	1.5	37.8	0.77	0.77	0.77	23.0
8	T1	25	3.0	0.296	12.2	LOS B	1.5	37.8	0.77	0.77	0.77	22.6
18	R2	109	3.0	0.296	12.2	LOS B	1.5	37.8	0.77	0.77	0.77	22.0
Approach		142	3.0	0.296	12.2	LOS B	1.5	37.8	0.77	0.77	0.77	22.2
East: E Lee Street												
1	L2	111	3.0	0.416	7.1	LOS A	3.2	82.3	0.55	0.37	0.55	31.1
6	T1	398	3.0	0.416	7.1	LOS A	3.2	82.3	0.55	0.37	0.55	30.9
16	R2	683	3.0	0.555	9.3	LOS A	5.0	129.0	0.63	0.43	0.63	29.3
Approach		1191	3.0	0.555	8.3	LOS A	5.0	129.0	0.60	0.41	0.60	30.0
North: Walker Drive												
7	L2	595	3.0	0.639	13.0	LOS B	8.3	212.4	0.88	0.94	1.23	27.4
4	T1	45	3.0	0.639	13.0	LOS B	8.3	212.4	0.88	0.94	1.23	27.3
14	R2	170	3.0	0.154	4.7	LOS A	0.9	24.3	0.57	0.41	0.57	31.4
Approach		809	3.0	0.639	11.2	LOS B	8.3	212.4	0.81	0.83	1.09	28.1
West: E Lee Street												
5	L2	186	3.0	0.329	11.2	LOS B	2.3	58.5	0.87	0.83	0.87	27.8
2	T1	288	3.0	0.409	10.5	LOS B	3.3	84.0	0.91	0.84	0.92	29.8
12	R2	8	3.0	0.409	10.5	LOS B	3.3	84.0	0.91	0.84	0.92	28.9
Approach		482	3.0	0.409	10.7	LOS B	3.3	84.0	0.90	0.83	0.90	29.0
All Vehicles		2624	3.0	0.639	9.9	LOS A	8.3	212.4	0.73	0.64	0.82	28.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Attachment B

Cost Estimate

SYIP PROJECTS
DETAILED PROJECT COST ESTIMATE SUMMARY
(Version: March 2020)

Portal ID:	**Lee / Walker RBT**	**Project UPC:**	**N/A**
Prepared By:	**Josh Hurst - Kittelson**	**Milestone**	**Creation/Pre Scope**
Reviewed By:	**0**	**Date:**	**11/1/2021**
County/City/Town:	**Fauquier County (30)**	**Tier Level**	**1**

Preliminary Engineering Phase [5]

Project Estimate Component		Proposed Project Cost Estimate ($)		
Discipline	**Source**	**Base ($)**	**Contingency (%)**	**Total**
Roadway	**Culpeper Tool**	$ 457,813	5.00%	$480,703
Hydraulics	**Culpeper Tool**	$ 104,591	5.00%	$109,820
In-plan Utilities	**Culpeper Tool**	$ 21,784	5.00%	$22,873
Traffic	**Culpeper Tool**	$ 86,850	5.00%	$91,193
Structures/Bridges	**Culpeper Tool**	$ 9,639	5.00%	$10,121
Materials/Geotech	**Culpeper Tool**	$ 39,270	5.00%	$41,234
Survey	**Culpeper Tool**	$ 208,986	5.00%	$219,435
Environmental	**Culpeper Tool**	$ 75,000	5.00%	$78,750
Right of Way	**Culpeper Tool**	$ 41,600	5.00%	$43,680
Other	**Culpeper Tool**	$ 58,384	5.00%	$61,303
	VDOT Oversight Costs	0	0.00%	$0
	Total PE Phase Estimate	**$ 1,103,916**	**5.00%**	$1,159,112
PE Base Estimate Date (XX/XX/XXXX)		**1/0/1900**		
PE Phase Dates (XX/XX/XXXX)	**Start Date**	**7/1/2023**	**End Date**	**7/1/2024**

Right-of-Way & Utilities Phase [6]

Discipline	**Source**	**Base ($)**	**Contingency (%)**	**Total**
Right-of-Way Acquisition	**Pre-Scoping Plans**	$566,805	60.00%	$906,888
Out-of-Plan Utilities (power, cable, gas, etc.)	**Pre-Scoping Plans**	$40,000	20.00%	$48,000
	VDOT Oversight Costs	$0	0.00%	$0
	Total RW Phase Estimate	$606,805	**57.36%**	$954,888
RW Base Estimate Date (XX/XX/XXXX)		**1/0/1900**		
RW Phase Dates (XX/XX/XXXX)	**Start Date**	**7/1/2024**	**End Date**	**1/1/2025**

Construction Phase [7]

Discipline	**Source**	**Base ($)**	**Contingency (%)**	**Total**
Mobilization/Constr. Survey	Culpeper Tool	$143,227	11.86%	$160,211
MOT	**Culpeper Tool**	$192,939	15.00%	$221,880
Roadway	Culpeper Tool	$897,908	15.00%	$1,032,594
Hydraulics	Culpeper Tool	$180,000	15.00%	$207,000
In-plan Utilities	Culpeper Tool	$50,000	15.00%	$57,500
Traffic	Culpeper Tool	$250,053	15.00%	$287,561
Structures/Bridges	Culpeper Tool	$107,583	15.00%	$123,721
Earthwork/Geotech	Culpeper Tool	$193,041	15.00%	$221,997
Environmental/Soundwalls	Culpeper Tool	$0	0.00%	$0
Other	Culpeper Tool	$0	0.00%	$0
	Total Bid Items	**$2,014,752**	**14.78%**	**$2,312,464**
Incidental-Claims & Work Orders (% of Bid Items; 5-10%max)	5.%	$100,738	14.78%	$115,623
Railroad Flagging/Coordination	See CN Estimate	$0	0.00%	$0
State Forces	See CN Estimate	$3,600	15.00%	$4,140
State Police	See CN Estimate	$0	0.00%	$0
Contract Requirements (Incentive/Disincentive; 5% max)	1.5%	$30,221	14.78%	$34,687
Construction Engineering (Inspection)	**Environmental Inspection ($)**	$0	0.00%	$0
	VDOT or Locality ($)	$402,950	14.78%	$462,493
	VDOT Oversight ($)	$0	0.00%	$0
	Total CEI			$462,493
	Total CN Phase Estimate	**$2,552,261**	**14.78%**	**$2,929,407**
CN Base Estimate Date (XX/XX/XXXX)		**1/0/1900**		
CN Phase Start Date (XX/XX/XXXX)		**1/1/2025**		
CN Phase End Date (XX/XX/XXXX)		**9/1/2025**		
Total Project Cost Estimate				**$5,043,408**

CULPEPER CONCEPT ESTIMATE WORKBOOK

Culpeper District Rev: 5/21/20

PROJECT INFORMATION	
Enter project description	
App. ID or UPC	Lee / Walker RBT
County	Fauquier
Estimate Date	11/1/2021
Estimate Compiler	Josh Hurst - Kittelson
Reviewed By	
PE Estimate By	Josh Hurst - Kittelson
PE Estimate Date	11/1/2021
RW Acq. Estimate By	Josh Hurst - Kittelson
Utility Estimate By	Josh Hurst - Kittelson
RW Estimate Date	11/1/2021
CN Estimate By	Josh Hurst - Kittelson
CN Estimate Date	11/1/2021
Other Remarks	

PROJECT ESTIMATE	Uninflated Base	% Cont. & CEI	$ Cont. & CEI	Uninflated Total
Total Estimate	**$3,759,294**	**34.2%**	**$1,284,113**	**$5,043,408**
PE Estimate	$1,103,916	5.0%	$55,196	**$1,159,112**
RW Property Acq.	$566,805	60.0%	$340,083	$906,888
RW Utility Reloc.	$40,000	20.0%	$8,000	$48,000
RW Estimate Total	$606,805	57.4%	$348,083	**$954,888**
CN Estimate	**$2,048,573**	**43.0%**	$880,835	**$2,929,407**
-Contingency		23.3%	$477,884	
-CEI		19.7%	$402,950	

PROJECT SCHEDULE	
PE Start Date	7/1/2023
RW Start Date	7/1/2024
CN Start Date	1/1/2025
CN Finish Date	9/1/2025

TIER
1

Quantity Calculations

Rev: 5/21/20

Update Workbook:

Enter project description	Fauquier
Josh Hurst - Kittelson	11/1/2021

EARTHWORK ITEMS

EARTHWORK TYPICAL SECTIONS

Description	Case	Section	Drainage	Length FT	Width (W)	Depth (D)	Slope (G:1)	QUANTITY CALCULATIONS Cut Area SF	Fill Area SF	RMC Area SF
Lee Street	Widen Fill	Full Sect	Curbing	400	6	2	3:1	24	17.5	18
Walker Drive / Oliver City Road	Widen Fill	Full Sect	Curbing	500	12	2	3:1	24	25	18
								0	0	0
								0	0	0
								0	0	0
								0	0	0
								0	0	0
								0	0	0
								0	0	0
								0	0	0

EARTHWORK ADJUSTMENTS

Clearing and Grubbing Area	7500	SF
Anticipated Unsuitable %		%
Anticipated % Excavation that is Rock		%
Temporary Grading	Incl. above	?

Shrinkage	SUMMARY CALCULATIONS Cut Vol CY	Fill Vol CY	RMC Vol CY
0.85	800	722.2222	600

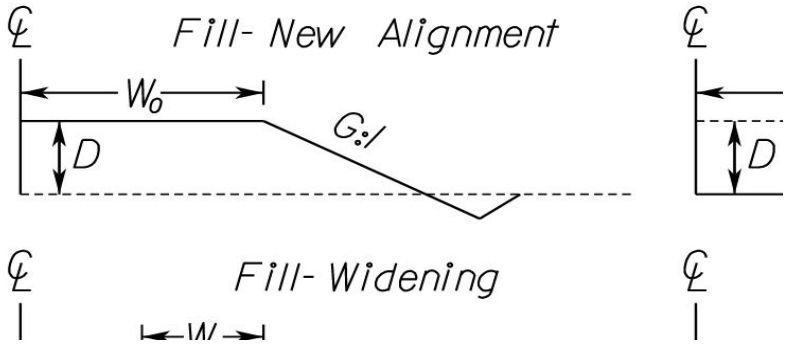
CALCULATED QUANTITIES

Regular Excavation	1377.777778	CY
Borrow Excavation	1329.411765	CY
Rock Excavation	0	CY
RECP EC-3 Type 3 for Slope Protection (>2:1)	0	SY
Use the above Calculated Quantities?	No	?

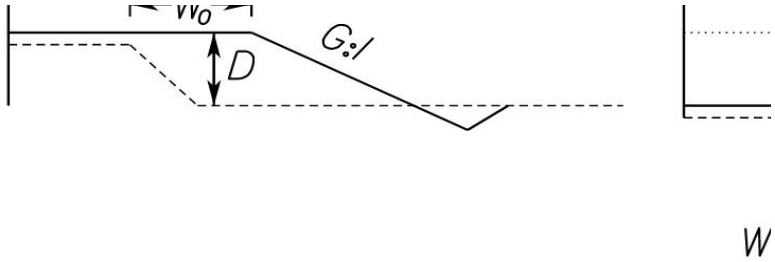
MANUAL QUANTITIES

Regular Excavation	1377.777778	CY
Borrow Excavation	2070.152505	CY
Rock Excavation		CY
RECP EC-3 Type 3 for Slope Protection		SY

RECOMMENDED INCIDENTALS



Retaining Wall Area (for Alternative Walls)	0	SF
RM-2 Retaining Wall (for Gravity Wall)	0	CY
RM-3 Retaining Wall (for Gravity Wall)	0	CY
Retaining Wall Excavation (for Gravity Wall)	0	CY
Porous Backfill (for Gravity Wall)	0	CY
Guardrail	0	LF
Guardrail Terminals	0	EA
Handrail	0	LF
QUANTITY TOTALS		
Clearing and Grubbing	0.172176309	AC
Regular Excavation	1377.777778	CY
Borrow Excavation	2070.152505	CY
Rock Excavation	0	CY
RECP EC-3 Type 3 for Slope Protection	0	SY
ADDITIONAL CUSTOM PAY ITEMS		
Description	Quantity	Units



ADDITIONAL COMMENTS AND ASSUMPTIONS

DRAINAGE ITEMS

LUMP SUM DRAINAGE ITEMS

Hydraulics Estimate Provided by:		
Hydraulics Estimate Date:		
Drainage estimate provided from Hydraulics=	$100,000	LS
Above number includes SWM?	No	?
Separate cost for SWM =	$50,000	LS
Above includes Erosion/Sediment Control?	No	?
Separate cost for Erosion/Sediment Control=	$30,000	LS
Above includes Large Culverts?	N/A	?
Above includes Nutrient Credits?	No	?
Total Hydraulics CN Cost	$180,000	LS
Normal Drainage Items Cost	$100,000	LS

ADDITIONAL CUSTOM PAY ITEMS		
Description	Quantity	Units

ADDITIONAL COMMENTS AND ASSUMPTIONS

SWM is assumed to be nutrient credits OR pervious pavers/bioretention. E&S is ~25% of earthwork cost. Assumes 10 structures at $5k each and 500' of pipe at $100/LF

PAVEMENT ITEMS

			QUANTITY CALCULATIONS						
			SM Area	SM Depth	SM Vol.	IM Area	IM Depth	IM Vol.	BM Area
			SY	IN	TON	SY	IN	TON	SY
ROADWAY PAVEMENT									
Full Depth Mainline Pavement (Design 1)	22000	SF	2444.444	2	268.8889	2444.444	3	403.3333	2444.444
Full Depth Shoulders	0	SF	0	2	0	0	3	0	0
Remove BM from Shoulders?	Yes	?							
Full Depth Auxiliary Pavement (Design 2)		SF	0	2	0	0	0	0	0
Mill & Overlay	31500	SF	3500	3	577.5	3500	0	0	3500
Temporary Pavement	0	SF	0	2	0	0	0	0	0
ENTRANCES									
Commercial Entrances/Parking Lots		SF	0	1.5	0	0	0	0	0
Private Entrance Method?		?							
Private Entrances (Asphalt Only)		SF	0	2	0	0	0	0	0
MISCELLANEOUS PAVEMENTS									
Shared Use Path		SF	0	2	0	0	0	0	0
Concrete Truck Apron	2826	SF							
AGGREGATE BASE FOR INCIDENTAL ITEMS									
Curbing	4897.5	SF							
Curb and Gutter	7525	SF							
Shoulder Gutter	0	SF							
Entrance Aprons	0	SF							
PAVEMENT REMOVAL & MODIFICATION									
Demolition of Pavement	20000	SF	2222.222	SY					
Obscuring Roadway	0	SF	0	UNIT					
Saw Cut (Full Depth or 1.5" Depth)	2600	LF							
Rumble Strips		LF							
PAVEMENT DESIGN									
Pavement Design Provided by:									

Pavement Design Date:					**Unit Weights**				
Surface Course Type	SM-9.5A	?			110	LB/IN/SY	SM		
Intermediate Course Type	IM-19.0A	?			110	LB/IN/SY	IM		
Base Course Type	BM-25.0A	?			122	LB/IN/SY	BM		
Aggregate Base Type	No. 21B	?			170	LB/CY	Agg.	135.15	LB/IN/SY
Location for Asphalt Weight	NoVa	?							
	Mainline	**Auxiliary**							
Pavement Structure Depths	**Design 1**	**Design 2**							
Surface Course Depth	2	2	IN						
Intermediate Course Depth	3		IN						
Base Course Depth	5	4	IN						
Aggregate Base Depth	8	4	IN						
Total Depth	18	10	IN						
Average Variable Overlay Depth	3	IN							
Temporary Pavement Design	Design 2	?							
QUANTITY TOTALS									
Surface Course SM-9.5A	846.3888889	TON							
Intermediate Course IM-19.0A	403.3333333	TON							
Base Course BM-25.0A	745.5555556	TON							
Aggregate Base No. 21B	2354.568283	TON							
9" Concrete Truck Apron	314	SY							
Flexible Pavement Planing	3500	SY							
Saw Cut (Variable Depth Asphalt)	2600	LF							
Demolition of Pavement	2222.222222	SY							
Obscuring Roadway	0	UNIT							
Rumble Strip (Asphalt)	0	LF							
ADDITIONAL CUSTOM PAY ITEMS									
Description	Quantity	Units							
ADDITIONAL COMMENTS AND ASSUMPTIONS									

ROADWAY INCIDENTAL ITEMS

CURBING		
Curb Type	Vertical	?
Length of Concrete Curb	3265	LF
Length of Curb & Gutter	2150	LF
Length of Shoulder Gutter		LF
Length of Asphalt Curb		LF
Area of Sign Island & Concrete Median	0	SF
Private Entrance Method?		?
Area of Concrete Entrance Aprons		SF
SIDEWALK		
Area of Sidewalk	11000	SF
Number of CG-12 Curb Cut Ramps	20	EA
Vertical Height of Stairs (Total for Project)		LF
Amenities and Furniture	Use custom below	
SAFETY BARRIER		
Guardrail Length	250	LF
Crashworthy Terminals	1	EA
Trailing Terminals		EA
Fixed Object Attachments		EA
Removal of Existing Guardrail		LF
Concrete Median Barrier Length (Flat Median)		LF
Concrete Med. Barrier (Up to 3' Grade Diff.)		LF
Impact Attenuators		EA
Pedestrian Handrail on Retaining Wall	75	LF
Additional Pedestrian Handrail		LF
Bicycle Handrail		LF
FENCING AND PROPERTY IMPACTS		
Woven Wire Fencing / Limited Access Fence		LF
Wood Board Fencing		LF
Impacted Mailboxes		EA
Clearing Parcels/Demolition of Buildings/Etc		LS
QUANTITY TOTALS		
Vertical Curb CG-2	3265	LF
Mountable Curb CG-3	0	LF
Vertical Curb & Gutter CG-6	2150	LF
Mountable Curb & Gutter CG-7	0	LF
Modified Shoulder Gutter	0	SY

AGGREGATE BASE FOR CONCRETE ITEMS					
Location	**Area**		**Concr. /**	**Agg. Depth**	
Curb	4897.5	SF	12	6	IN
Curb&G	7525	SF	7	11	IN
ShlderG	0	SF	10	8	IN
Aprons	0	SF	7	6	IN
Pavement Design					?
Total Depth				18	IN

Asphalt Curb MC-3B	0	LF
Concrete Median MS-1A	0	SY
Concrete Entrance CG-9D	0	SY
4" Sidewalk	1222.222222	SY
CG-12 Detectable Warning Surface	44.44444444	SY
Class A3 Concrete (for Stairs)	0	CY
Reinforcing Steel (for Stairs)	0	LBS
Handrail Type 1 (for Stairs)	0	LF
Handrail Type 2 (for Pedestrians)	75	LF
Handrail Type 3 (for Bicycles)	0	LF
Guardrail GR-MGS1	250	LF
Guardrail Terminal GR-MGS2	1	EA
Guardrail Trailing Terminal GR-MGS3	0	EA
Guardrail Fixed Object Attachment GR-FOA	0	EA
Removal of Existing Guardrail	0	LF
Concrete Median Barrier MB-7	0	LF
Concrete Median Barrier MB-8A	0	LF
Impact Attenuators IA-1 (TL-3)	0	EA
Woven Wire Fence (FE-W1) + 50% Increase	0	LF
Wood Board Fencing	0	LF
Mailbox Post, Single	0	EA
Clearing Parcels/Demolition of Buildings/Etc	$0	LS

ADDITIONAL CUSTOM PAY ITEMS

Description	Quantity	Units

ADDITIONAL COMMENTS AND ASSUMPTIONS

STRUCTURE & BRIDGE ITEMS

RETAINING WALL

Retaining Wall Type	Gravity
Retaining Wall Method	Calculated
Handrail? (Recommended in most locations)	Yes

RETAINING WALL QUANTITY ALTERNATIVES

	RM-2	RM-3	RW Excv.	Por. BF	Alt. Wall	Handrail
Chosen	53.68056	0	124.0278	18.05556	0	75
Earthwrk	0	0	0	0	0	0

Wall in Cut or Fill?	Cut		**Calculate**	53.68056	0	124.0278	18.05556	0	75	
Wall Length for Calculation	75	LF								
Wall Height for Calculation	7	LF								
Live Load?	No	?								
BRIDGES										
PERMANENT BRIDGES										
Number of Bridge Structures		EA								
Bridge Engineer's Estimate for Perm. Bridges		LS								
TEMPORARY BRIDGES										
Number of Temporary Bridges		EA								
Bridge Engineer's Estimate for Temp. Bridges		LS								
QUANTITY TOTALS										
Permenant Bridges	$0	LS								
Temporary Bridges	$0	LS								
Concrete Retaining Wall (RW-2)	53.68055556	CY								
Conc. Retaining Wall Live Load (RW-3)	0	CY								
Retaining Wall Excavation	124.0277778	CY								
Porous Backfill for Wall	18.05555556	CY								
Alternative Retaining Wall	0	SF								
ADDITIONAL CUSTOM PAY ITEMS										
Description	Quantity	Units								
ADDITIONAL COMMENTS AND ASSUMPTIONS										

TEMPORARY TRAFFIC & CONSTRUCTION ITEMS

MOT Estimate Method	Percent			
Maintenance of Traffic Percentage	10	%	Contract Sub-Total	$1,609,393
Maintenance of Traffic Total Cost	$160,939	LS		
ADDITIONAL TRAFFIC CONTROL				
Estimated Cost for Police Patrols		LS		
Temporary Signalization		LS		
TEMPORARY CONSTRUCTION ITEMS				

Months of Field Office	8	MO
Temporary Sheet Piling		SF
Temporary Concrete Barrier (MB-7D)		LF
Temporary Impact Attenuators		EA
Temporary Grading and Pavement should be included in their respective sections above.		

ADDITIONAL CUSTOM PAY ITEMS

Description	Quantity	Units

ADDITIONAL COMMENTS AND ASSUMPTIONS

PLANTING ITEMS

Area of land to be seeded	40000	SF
Landscaping Estimate Method	Percent	
Landscaping Percentage	2	%
Landscaping Total Cost	$36,047	LS
Area of land to be seeded	0.918273646	AC
Assumed normal seeding rate	160	LB/AC

Contract Sub-Total	$1,802,333

QUANTITY TOTALS

Regular Seed	183.6547291	LB
Overseeding	146.9237833	LB
Temporary Seed	91.82736455	LB
Topsoil Class A (2" Depth)	0.918273646	AC
Lime	3.213957759	TON
Fertilizer N	60.26170799	LB
Fertilizer P	120.523416	LB
Fertilizer K	60.26170799	LB
HECP Type 3 (assumed for average slope)	10000	SY
Landscaping	$36,047	LS

ADDITIONAL CUSTOM PAY ITEMS

Description	Quantity	Units

ADDITIONAL COMMENTS AND ASSUMPTIONS

PERMANENT TRAFFIC CONTROL DEVICE ITEMS

SIGNING				
Signing Estimate Method	Percent			
Signing Percentage	3	%	Contract Sub-Total	$1,201,757
Signing Base Cost	$36,053	LS		
Additional Overhead Signing		LS		
PAVEMENT MARKINGS				
Pavement Markings Estimate Method	4in Lines			
Length of 4" Pavement Marking Lines	7000	LF	<- Does not include RPMs, symbols, bars. Adjust contingency.	
4" Type B1 Pavement Marking	7000	LF		
SIGNALS				
Signal Estimate		LS		
Signal Estimate Provided by:				
Signal Estimate Date:				
LIGHTING				
Lighting Estimate	$200,000	LS		
Lighting Estimate Provided by:				
Lighting Estimate Date:				
ITS COMPONENTS				
ITS Estimate		LS		
ITS Estimate Provided by:				
ITS Estimate Date:				
ADDITIONAL CUSTOM PAY ITEMS				
Description	Quantity	Units		

ADDITIONAL COMMENTS AND ASSUMPTIONS

IN-PLAN UTILITIES

Utility Estimate Provided by:		
Utility Estimate Date:		
Water Service Estimate	$25,000	LS
Sanitary Sewer Estimate	$25,000	LS
ADDITIONAL CUSTOM PAY ITEMS		
Description	Quantity	Units

ADDITIONAL COMMENTS AND ASSUMPTIONS

ENVIRONMENTAL MITIGATION CONSTRUCTION

Noise wall area		SF
Stream or Wetland Restoration		LS
Contaminated Soil Disposal / Tank Removal		LS
ADDITIONAL CUSTOM PAY ITEMS		
Description	Quantity	Units

ADDITIONAL COMMENTS AND ASSUMPTIONS

NON-BID INCIDENTAL COSTS

PROPERTY IMPACTS		
R/W Monuments	12	EA
Estimated Cost for Police Patrols	$0	LS
Railroad Flagging and Construction (Force Ac't)		LS
ADDITIONAL CUSTOM PAY ITEMS		

Description	Quantity	Units	

ADDITIONAL COMMENTS AND ASSUMPTIONS

Unit Cost Entry

Rev: 5/21/20

Enter project description	Fauquier
Josh Hurst - Kittelson	11/1/2021

GRADING ITEMS	---					Estimate
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$193,041**
Clearing and Grubbing	0.172176	AC	$100,000			$17,218
Regular Excavation	1377.778	CY	$60			$82,667
Borrow Excavation	2070.153	CY	$45			$93,157
DRAINAGE ITEMS	---					Estimate
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$180,000**
Roadway General Drainage	1	LS	$100,000			$100,000
Erosion & Sediment Control	1	LS	$30,000			$30,000
Stormwater Management	1	LS	$50,000			$50,000
PAVEMENT ITEMS	---					Estimate
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$493,236**
Aggr. Base Matl. Ty. I No. 21B	2354.568	TON	$40			$94,183
Reinf. HCC Pave. 9" Truck Apron (Include stamped pattern)	314	SY	$350		includes pervious paver base for SWM	$109,900
Asphalt Concrete Ty. IM-19.0A	403.3333	TON	$120			$48,400
Flexible Pave. Planing 0"-2"	3500	SY	$7			$24,500
Asphalt Conc. Ty. SM-9.5A	846.3889	TON	$110			$93,103
Asphalt Concrete Ty. BM-25.0A	745.5556	TON	$105			$78,283
Saw-Cut Asph Conc. (Variable Depth)	2600	LF	$7			$18,200
Demolition of Pavement (Flexible)	2222.222	SY	$12			$26,667
ROADWAY INCIDENTAL ITEMS	---					Estimate
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$335,481**
Standard or Radial CG-2	3265	LF	$30			$97,950
Standard or Radial CG-6	2150	LF	$39			$83,850
CG-12 Detectable Warning Surface	44.44444	SY	$510			$22,667
Hydraulic Cement Concrete Sidewalk 4"	1222.222	SY	$85			$103,889
Guardrail GR-MGS1 (consider 6' or 9' post)	250	LF	$40			$10,000
Guardrail Terminal GR-MGS2	1	EA	$4,000			$4,000
Handrail HR-1 Type 2 (Pedestrian)	75	LF	$175			$13,125
STRUCTURE & BRIDGE ITEMS	---					Estimate
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$107,583**
Retaining Wall RW-2	53.68056	CY	$1,500			$80,521
Porous Backfill	124.0278	CY	$200			$24,806
Retaining Wall Excavation	18.05556	CY	$125			$2,257
TEMPORARY TRAFFIC & CONSTRUCTION ITEMS	---					Estimate
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$192,939**
General Maintenance of Traffic	1	LS	$160,939			$160,939
Field Office Type 1 or Type 1 Modified	8	MO	$4,000			$32,000
PLANTING ITEMS	---					Estimate
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$69,192**
Landscaping	1	LS	$36,047			$36,047

Topsoil Class A 2"	0.918274	ACRE	$15,000			$13,774
Temporary Seed	91.82736	LB	$16			$1,469
Regular Seed	183.6547	LB	$20			$3,673
Overseeding	146.9238	LB	$8			$1,175
Hydraulic Erosion Control Product Type 3	10000	SY	$1			$10,000
Fertilizer Nitrogen - N	60.26171	LB	$4			$241
Fertilizer Phosphorous - P	120.5234	LB	$4			$482
Fertilizer Potassium - K	60.26171	LB	$4			$241
Lime	3.213958	TON	$650			$2,089
TRAFFIC CONTROL DEVICE ITEMS	---					**Estimate**
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$250,053**
Signing	1	LS	$36,053			$36,053
Type B Class I Pavement Line Marking 4"	7000	LF	$2			$14,000
Lighting	1	LS	$200,000			$200,000
UTILITY ITEMS	---					**Estimate**
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$50,000**
Water Utility	1	LS	$25,000			$25,000
Sanitary Sewer	1	LS	$25,000			$25,000
ENVIRONMENTAL MITIGATION ITEMS	---					**Estimate**
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$0**
NON-BID INCIDENTAL ITEMS	---					**Estimate**
Description	**Quantity**	**Units**	**Unit Cost**	**Price Source**	**Remarks**	**$3,600**
R/W Monument RM-2	12	EA	$300			$3,600

Roadway Sub-total	**$1,201,757**
Disruptive Construction Sub-total	**$1,609,393**
Project Construction Sub-total	**$1,802,333**
Contract Quantity Total	**$1,871,524**
Non-bid Total	**$3,600**
Total Item Cost	**$1,875,124**

PROJECT INFORMATION		
Enter project description		
Estimate Date	11/1/2021	
Estimator Name	Josh Hurst - Kittelson	
County	Fauquier	
Project Length	1500	LF
Estimated # Sheets	3	Sheets
Project Tier	Tier 1	
# of Connections	2	
# of Prop. Bridges		Bridges
Survey Length	3500	LF
In-House Rate	80	$/HR
Survey Rate	140	$/HR
Consultant Rate	150	$/HR
Other Remarks		

CONCEPTUAL PE ESTIMATING TOOL

Culpeper District Rev: 3/6/20

Estimator data
Calculated data
Estimate totals

Note: The accuracy of this tool has been verified with very few projects. The total estimate provided should be checked using another method, such as comparison with similar projects.
See the hidden tab "PE Data" for hour sources.
Avoid using the "Simple" level for low-hours tasks.

WARNING: PROJECT LENGTH < 2000', TOTAL HAS BEEN REVIEWED BY:

TOTAL CALCULATIONS							GRAND TOTAL		$1,193,886
	Inflation/Yr	3%	Today	2021	Start PE	2022	Inflation	3.0%	$34,773
							Contingency	5%	$55,196
							Total		$1,103,916
Remarks									

ROAD DESIGN/PROJECT MANAGEMENT								Subtotal	$457,813
# of Public Meetings	2								
	Designer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Road Plans	Consultant	Complex	1400	2800	/Mile	2195		$150	$329,318
TMP Plans	Consultant	Complex	300	600	/Mile	470		$150	$70,568
Project Mgmt	Consultant	Moderate	225	450	/Mile	353		$150	$52,926
Public Meetings			2	Meetings		$/Mtg		$2,500	$5,000
Miscellaneous Cost									
Remarks									

HYDRAULICS DESIGN								Subtotal	$104,591
Urban vs. Rural	Urban								
# of Prop. Bridges	0								
# of BMPs	1								
# of Large Culverts									
Floodplain Encroach.									
	Designer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Hydr. Design	Consultant	Moderate	150	800	/Mile	377		$150	$56,591
E&SC Design	Consultant	Moderate	40	40	/Sheet	160		$150	$24,000
SWM Design	Consultant	Moderate	0	160	/BMP	160		$150	$24,000
Bridge H&HA	Consultant	Moderate	0	250	/Bridge	0		$150	$0
River Mech.	Consultant	Moderate	225	0	/Proj.	0		$150	$0
Nutrient Credits									$0
Miscellaneous Cost									
Remarks									

TRAFFIC CONTROL DEVICE DESIGN								Subtotal	$75,750
# of Signals									
Signals in MOT									
	Designer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Sign/PM Plans	Consultant	Moderate	100	50	/Sheet	250		$150	$37,500
Signal Plans	Consultant	Moderate	95	180	/Signal	0		$150	$0
Lighting Plans	Consultant	Moderate	135	40	/Sheet	255		$150	$38,250
ITS Plans	Consultant	None	0	0	/Sheet	0		$150	$0
Miscellaneous Cost									
Remarks									

SURVEY								Subtotal	$208,986
# Utilities	4	Lines							
LF Utility in Limits	6000	LF							
LF Utility Survey	14000	LF							
# of Test Holes	7.5	Holes							
	Designer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Base Survey									$150,000
Subsurface Utility	Consultant	Moderate	0	65	/Mile	172		$140	$24,129
RW Sheets	Consultant	Moderate	25	500	/Mile	167		$150	$25,057
Test Holes	Consultant	Moderate	10	8	/Hole	70		$140	$9,800
Miscellaneous Cost									
Remarks									

ENVIRONMENTAL								Subtotal	$75,000
	Designer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Environmental Costs									$75,000
Miscellaneous Cost									
Remarks									

STRUCTURAL DESIGN								Subtotal	$9,639
# of Prop. Bridges	0	Bridges							
Length of Ret. Wall	75	ft							
Length of Noise Wall	0	ft							
	Designer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Structural Design									$0
Noise Walls	Consultant	Moderate	60	300	/Sheet	0		$150	$0
Retaining Walls	Consultant	Moderate	60	300	/Sheet	64		$150	$9,639
Miscellaneous Cost									
Remarks									

MATERIALS/GEOTECHNICAL DESIGN								Subtotal	$39,270
Length of Walls	75	ft							
Cuts/Fills > 25'?									
# of Large Culverts	0	Culverts							
# of BMPs	1	Ponds							
# of Prop. Bridges	0	Bridges							
# of Soil Borings	13.5	Borings							
	Designer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Materials Engineer	Consultant	Moderate	60	15	/Sheet	105		$150	$15,750
Soils Investigation	Consultant	Moderate	60	8	/Boring	168		$140	$23,520
Miscellaneous Cost									
Remarks									

UTILITY DESIGN								Subtotal	$21,784
# of In-Plan Utilities	2	utilities							
Default Length	1500	ft/utilty							
Override Length		ft/utilty							
	Designer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Utility Design	Consultant	Moderate	60	300	/Mile	145		$150	$21,784
Miscellaneous Cost									
Remarks									

LANDSCAPE DESIGN								Subtotal	$18,784
	Designer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Landscape Design	Consultant	Moderate	40	300	/Mile	125		$150	$18,784
Miscellaneous Cost									
Remarks									

TRAFFIC STUDIES								Subtotal	$11,100
# of Intersections	1	intx							
# of Interchanges		intx							
Study Complete?	No								
Interchange Report?									
	Designer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Update Traffic Study	Consultant	Moderate	25	12	/Intx	0		$150	$0
IJR/IMR	Consultant	Moderate	0	400	/Intx	0		$150	$0
Full Traffic Study	Consultant	Moderate	50	24	/Intx	74		$150	$11,100
Miscellaneous Cost									
Remarks									

PLAN REVIEW/COORDINATION								Subtotal	$81,200
Roundabout?	Yes								
Railroad Impact?	No								
	Reviewer	Level	Base Hrs	Hrs/Unit	Unit	Total Hrs	Override Hrs	Unit Price	Total Cost
Right of Way	District	Moderate	80	60	/Sheet	260		$80	$20,800
Utility Coordination	District	Moderate	80	60	/Sheet	260		$80	$20,800
Railroad Review	Consultant	Moderate	100	30	/Sheet	0		$150	$0
Traffic Eng. Review	District	Moderate	60	15	/Sheet	105		$80	$8,400
Construction	District	Moderate	60	15	/Sheet	105		$80	$8,400
C.O. Review	Central Office	Moderate	60	15	/Sheet	0		$80	$0
Roundabout Comm.	Central Office	Moderate	80	0	/Rnd'bt	80		$80	$6,400
Programming	District	Moderate	100	0	/Sheet	100		$80	$8,000
V.E. Study	District	Moderate	240	0	/Proj	0		$80	$0
L&D Rev./Approval	District	Moderate	60	15	/Sheet	105		$80	$8,400
Miscellaneous Cost									
Remarks									

MISCELLANEOUS ITEMS						Subtotal	$0
Item #1							
Item #2							
Item #3							
Item #4							
Item #5							
Remarks							

PARCEL NO.	LANDOWNER	SHEET NO.	AREA																
			TOTAL	FEE TAKING		PRESCRIPTIVE R/W		FEE REMAINDER		EASEMENTS									
										PERMANENT		UTILITY		TEMPORARY		TEMPORARY (ENTRANCES)		PROFFERS
			ACRES OR SQUARE FEET	ACRES OR SQ FEET	$30/SF	ACRES OR SQ FEET	HECTARES OR SQ METERS	ACRES OR SQ FEET	HECTARES OR SQ METERS	ACRES OR SQ FEET	HECTARES OR SQ METERS	ACRES OR SQ FEET	HECTARES OR SQ METERS	ACRES OR SQ FEET	$5/SF	ACRES OR SQUARE FEET	HECTARES OR SQ METERS	YES / NO
-6274	ATABONGNKENG, AWUNGANYI E		0.435 AC	0.023 AC	$ 30,000			0.412 AC						0.069 AC	$ 15,000			
-7380	NICHOLS, JESSE T		0.435 AC	0.069 AC	$ 90,000			0.366 AC						0.069 AC	$ 15,000			
-3635	REMLAND LLC		11.570 AC	0.000 AC	$ -			11.570 AC						0.000 AC	$ -			
-8996	DREW CORPORATION THE		0.760 AC	0.161 AC	$ 209,910			0.600 AC						0.075 AC	$ 16,335			
-5032	HISTORIC FIELDS LLC		0.454 AC	0.137 AC	$ 179,670			0.317 AC						0.050 AC	$ 10,890			
	LEE ST AND WALKER DR ROUNDABOUT TOTALS:				$ 509,580										$ 57,225			